

CLAIMS

I claim:

1. A vibration isolation, position actuation device comprising:

a pneumatic actuator,

a pressure servo-valve,

an air pressure supply,

a coil and magnet,

a state variable sensor, and

a control unit

wherein the pressure servo-valve accepts an input command signal and modulates the air pressure supply which is applied to the pneumatic actuator, wherein the state variable sensor measures a state variable of the pneumatic actuator resulting from the applied modulated air pressure supply, wherein the control unit determines the error existing in the measured state variable relative to the command signal, and wherein the control unit modulates electrical current applied to the coil such that a magnetic force is applied to the pneumatic actuator by the magnet in such proportion to negate the measured error in the state variable of the pneumatic actuator.

2. The device of Claim 1 further comprising an air tank connected to the pneumatic actuator such that the combined air volume of the pneumatic actuator and air tank provide an air volume yielding a prescribed air-spring stiffness.
3. The device of Claim 1 wherein the pneumatic actuator is further comprised of a carriage and a housing wherein the carriage is constrained to move within the housing upon air bearings such that frictionless motion of the carriage is achieved.
4. The device of Claim 1 wherein the coil is attached to one of the carriage and housing and the magnet is attached to the other.
5. The device of Claim 1 wherein the state variable sensor is a pressure transducer positioned to read the pressure applied to the pneumatic actuator and yield an amplified voltage equal to the force resulting from the pneumatic actuator.
6. The device of Claim 1 wherein the control unit compares the amplified voltage from the pressure transducer to the input command signal to determine a force error measurement of the pneumatic actuator such that the control unit is then enabled to apply the force error measurement directly as an input current to the coil.